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The Engineers' Architects' and Builders' News

VOLUME XVI · SAN FRANCISCO, CAL., MAY 26, 1906 · No. 8

Reinforced Concrete

BY CHARLES S. HILL.

The capacity of resistance to tension of concrete is much less than the ultimate compressive resistance; when a concrete beam, for example, is subjected to transverse loading, it fails by tearing apart on the tension side. The purpose of the combination of concrete and steel known as reinforced concrete is to supply the deficiency of tensile strength in concrete—to make possible the construction of a beam or other member almost entirely of concrete, but which shall, by having imbedded in it steel rods of desired shape and suitable cross-sectional area in proper positions, possess a high capacity to take tensile stresses. The fundamental theory of the combination is that the disposition of the concrete and the steel in the section is such that the two elements act as a single unit, all stresses being divided between the concrete and the steel where the latter occurs.

Actual construction of reinforced concrete falls somewhat short of reaching the theoretical perfection; it is not posible to distribute the steel perfectly through the concrete nor is it possible to secure that absolute adhesion between the concrete and steel which is necessary to perfect transmission of the stresses from one material to the other. These defects have to be allowed for in practical design; they may be reduced to quite minute proportions by good design and good workmanship, and they may be so accentuated by poor design and poor workmanship that a weak and dangerous material results.

Premising reasonably good design and workmanship, the claims which reinforced concrete presents as a structural material are sound and important The compressive resistance of concrete is about ten times its tensile resistance, while steel has about the same strength in tension as in compression. Volume for volume, steel costs about fifty times as much as concrete For the same sectional areas, steel will support in compression thirty times more load than concrete, and in tension three hundred times the load concrete will carry. Therefore, for duty under comression only, concrete will carry a given load at six-tenths of the cost required to support it with steel. On the other hand, to support a given load by concrete in tension would cost about six times as much as to support it with steel. If, then, the various members of a structure are so designed that all the compression stresses are resisted by concrete and steel is introduced to resist the tensile stresses, each material will be serving the purpose for which it is cheapest and best adapted and one of the principles of economic design will be fulfilled. This is the economic claim which reinforced concrete presents as a structural material.

Other important advantages secured in the combination of concrete and imbedded steel are: that the protection of the metal elements from corrosion is practically perfect; that the fire and heat resisting qualities of a masonry structure are secured at about the cost of a more or less temporary unprotected steel structure. That concrete is an almost perfect protection of steel from corrosion, is a fact almost beyond reasonable dispute. Both theory and the evidence of actual experience support this statement. It is to be noted, however, that concrete, to be effective in preventing rusting, must be dense, without voids and cracks, and in close contact with the metal at all points. The fire-resisting qualities of concrete have been subjects of much dispute. Theoretically, concrete being a hydrated compound should disintegrate with the expulsion of the water of hydration by heat. Practically, however, such disintegration must be very slow because of the high temperature required to drive off the water and because of the poor heat conductivity of the material. To set against whatever weakness concrete may have in the respect mentioned, we have the indisputable evidence that concrete structures have met the requirements of the most severe municipal fire tests and have successfully withstood the attacks of actual conflagration.

The rapid growth of reinforced concrete in public favor has been little short of marvelous. It is now used for nearly every form of structure for which timber, steel, or masonry is suitable Indeed, its greatest evil is that it has been crowded into uses for which there is small warrant for its adoption as compared with the older materials. This condition must be charged in large measure to the fact that proprietary concerns have been chiefly instrumental in promulgating the use of the new material. Their purpose has not been that of true engineering to adopt the material only for such uses as it is particularly fitted, but that of the sales agent, to dispose of as much material as possible by forcing its use in every conceivable way. The natural result has been to see reinforced concrete used in many places where plain concrete would have served well enough, and in other places where every consideration called for the use of steel. The remedy for this evil will come with the passing of concrete-steel work into the hands of engineers whose only object is to employ the material best fited for their purpose, be it whatever it may, and this transition has already begun. Another evil arising from the same cause and destined to be remedied in the same way is the tacit acceptance of empiricism as a rule of design. Already the theory of reinfored concrete in engaging the time and attention of many competent engineers, and a mass of reliable test data is being accumulated which will soon relegate empirical rules for reinforced concrete to the position they have long occupied in designing steel structures.

These strictures against empiricism will doubtless meet with opposition from some quarters, but they are entirely warranted. There is no place in engineering for guess-work whenever scientific determination is possible. It is becoming increasingly plain, moreover, that it is possible in reinforced concrete work. The common assumption of certain builders, that the laws, formulas and methods of calculation used for ordinary materials cannot be applied to such a combination of two materials as is reinforced concrete, comes very close to being utter nonsense. The sooner such assumptions are banished from reinforced concrete work, the better it will be for the engineer and the building public; any attempt to weave a net of mystery about the new material is entirely wrong.

* A paper read before the Association of Portland Cement Manufacturers.

Pressure Supply Pipes for Hydraulic Installations.

BY GEORGE J. HENRY, JR.

[CONCLUDED.]

If the velocity in the pipe is favorable, it may become coated in some cases with a vegetable or slimy growth on the interior surface; but this difficulty does not ordinarily affect the carrying capacity of pipe lines for power transmission lines, probably on account of the velocities applied, as well as the high pressures involved. The joints of the plates in a riveted line, as well as the projecting rivet heads, will provide quite an obstruction to the flow of the water. In the lap-welded pipe, where properly welded together, this is entirely eliminated, except at the joints, at which point it is reduced to a minimum.

It will be readily seen, by making a comparison of the friction losses in a pipe of given dimesions, that these will be very much less in the lap-welded line than in the riveted, thus securing a greater energy output from the lap-welded line. In the case of a line running from thirty-two inches to twenty-four inches in diameter and 5500 feet long, recently calculated by the writer, this showed an advantage corresponding with an additional investment of about $19,000 due to the use of the lap-welded line; whereas, under high pressures, the cost of such a line is about the same as that of a sheet steel riveted line.

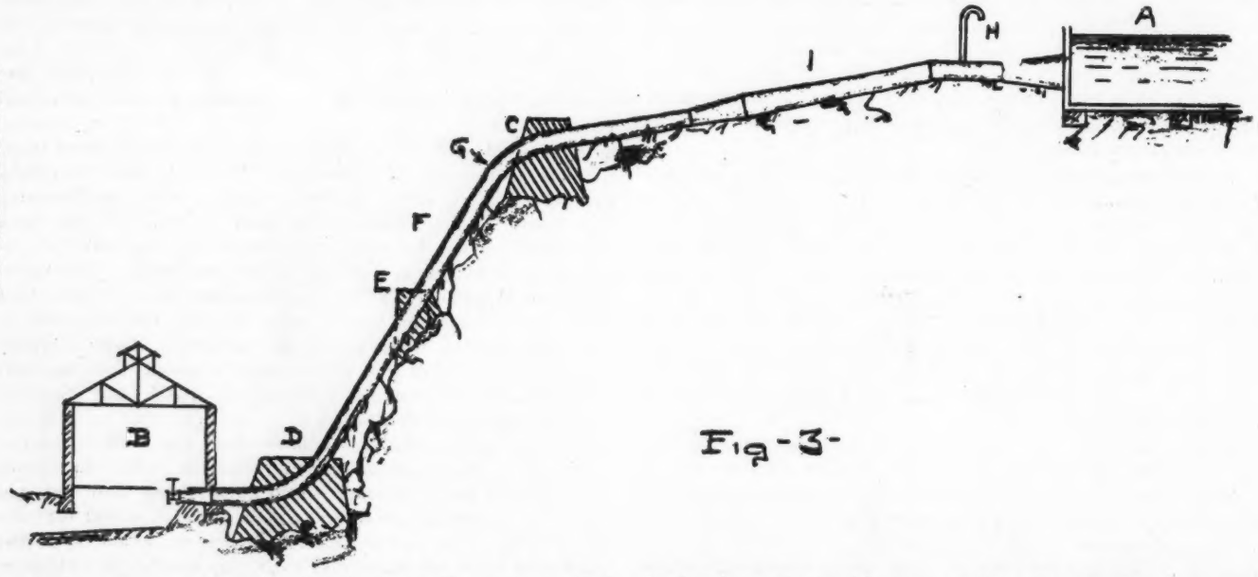

Fig-3-

In locating a pipe line in the trench provided for it, and riveting it up and properly locating the anchors, the greatest care should be taken, as there is probably no class of installation work in which greater damage may be inadvertently caused than in a high pressure line of this character. Figure 3 shows diagramatically such a pipe line. At A we have the water supply; at B the power house to which we wish to deliver the water under pressure. The pipe should commence well below the surface at A, with a suitable inlet taper pipe flaring out to a diameter at least 25 per cent. greater than the straight sections following it. The taper should be a gentle one, not shorter than seven to ten times the enlargement of diameter that occurs in it. Some form of suitable gate valve or head gate should be arranged for cutting off the water from the pipe line when required. Just outside of the drain or forebay should be located an air inlet, so arranged with a suitable cap or bend that water will not overflow from it, but that air may freely enter when the head gate is closed. An elbow is shown at C, at which point it is assumed the pipe will take a sudden dip down the hill; and at D a reverse curve, so that the line may properly enter the power house. If the line is a long one, it will probably be made up in three or more sizes for the proper distribution of material and to secure its telescoping, so as to secure the best freight rates. Such changes in diameter must not occur too abruptly, but should occur in long taper sections. Usually, it is the practice to commence the laying of the heaviest pipe adjacent to the power house and to advance up the hill. The pipe should, of course, be well anchored. This anchoring should be done as the work proceeds. In large lines, the anchors should invariably extend to bedrock, and there should be a very substantial anchor at the bottom of the hill, at the point D. Should the pipe be securely anchored at the point marked E, and the anchor D left off until the work had advanced up the hill to some point, as at F, it will be seen that expansion and contraction will cause extremely damaging strains in that section between D and E, as when your pipe expands during the heat of the day, instead of pushing the section D-E up the hill, the entire friction against the hillside, added to the weight of the pipe, will tend to force the elbow D further into the ground, which is usually soft fill, this having been thoroughly excavated to allow for the proper installation of the elbow. During the night, when the pipe and hillside cool off, it will shrink the section D-E down hill again. The process will be repeated from day to day, each successive change in temperature causing an extremely dangerous breaking strain at the point marked G. It is a good rule, therefore, to always anchor the line securely whenever a point is reached in the construction which corresponds with a change in direction, and to protect the line as far as possible during construction from changes in temperature, as it will be readily seen that if the elbows D and C are securely anchored in concrete and the pipe left open to the sun's rays between these points very dangerous expansion and contraction will occur. If the pipe is properly put together there is no reason why it should not be covered up as the work proceeds; and if there is any question about the mechanical work, it will be far better to put additional investment into securing the very best than to take any chances by leaving the pipe exposed. Too much care cannot be taken in properly locating the anchors and securing the pipe to them. The least settling of the ground will throw strains on the pipe which cannot be calculated, and an anchor that does not go to bedrock is not often of much value. The writer has seen more than one extremely expensive pipe line

which was in places holding up its own anchors instead of the anchors supporting the pipe.

A pipe line, in conforming to the general shape of that shown in Figure 3, should also be protected with an air valve at the point C, in addition to the air inlet pipe H, for the reason that should any break in the pipe line occur at the bottom of the hill, or any sudden increase of velocity occur, as, for instance, due to the sudden opening by the governor of the hydraulic gates, the natural result is that the column of water in the pipe on the heavy grade F will get into motion before the water in the more nearly horizontal line I, resulting in a tendency to form a vacuum at or near the elbow C. If no adequate air inlet is provided at this point, the result will probably be a collapse of the pipe, due to atmospheric pressure on the outside. If the pipe does not collapse, and a vacuum of any size is formed, and the governor should again check the velocity in the column F before the column I has caught up with it, there will occur a water hammer in the upper portion of the pipe line which may result in very great damage. Several cases are on record where a sudden increase in velocity, due to the demands made by the governor when a short circuit comes on the line, has been suddenly checked when the circuit breakers automatically opened or when the load was thrown off in the station, causing the pipe to break in a number of places, due to the breaking into several parts of the water column and these parts again coming together. If the necessary amount of air has been admitted at C by a suitably designed air valve, this will form a cushion acting exactly the same as an air chamber, and tend to check water hammer. Were it not for the elasticity of the metal in most pipe lines, this water hammer would assume very much more serious proportions; but it is not well

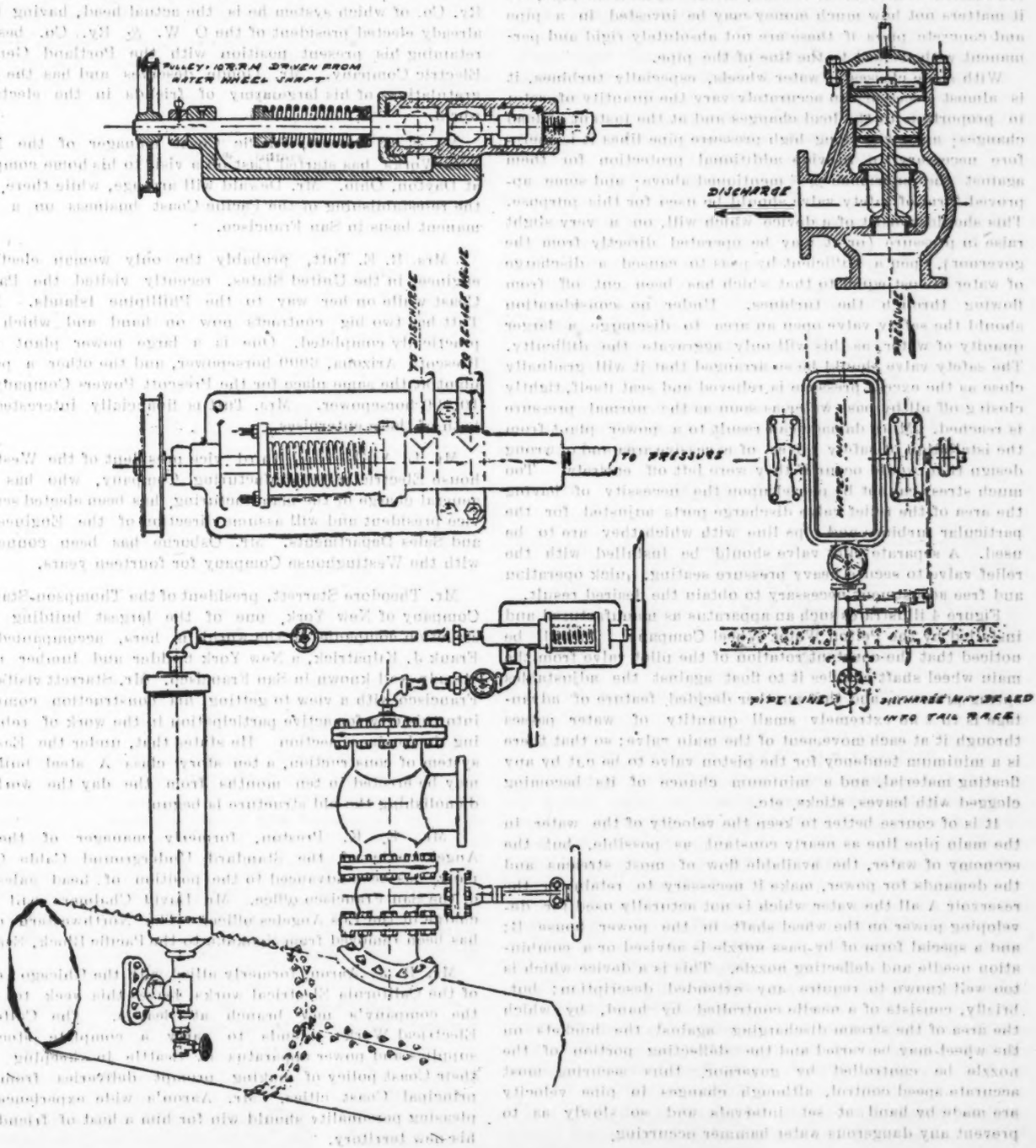

Fig. 4

to count on this as giving any additional security, as parts which have become crystalized, due to rolling them after they are too cold, or rivets and butt straps crystallized from too much hammering, have but a very low elastic limit, and permanent damage to them is likely to result, even though an actual break does not occur at the moment of the velocity change.

The energy in a moving column of water is Mv^2, and in a pipe line several thousand feet lo g carrying water at a high velocity, this may run into millions of foot-pounds, and the strain resulting is a maximum at the power house and a minimum at the inlet end of the pipe. It is good practice, therefore, to build a power pipe line with a safety factor much larger at the power house than near the inlet. The foundation should be chosen with the greatest care, with a view to eliminating any possibility of the shifting of the foundation or movement of earth masses against the pipe, for it matters not how much money may be invested in a pipe and concrete piers if these are not absolutely rigid and permanent with respect to the line of the pipe.

With some classes of water wheels, especially turbines, it is almost necessary to accurately vary the quantity of water in proportion to the load changes and at the instant of load changes; and with long high pressure pipe lines it is therefore necessary to provide additional protection for them against the enormous Mv^2 mentioned above; and some approved form of safety valve should be used for this purpose. This should consist of a device which will, on a very slight raise in pressure (or it may be operated directly from the governor), open a sufficient by-pass to caused a discharge of water almost equal to that which has been cut off from flowing through the turbines. Under no consideration should the safety valve open an area to discharge a larger quanity of water, as this will only aggravate the difficulty. The safety valve should be so arranged that it will gradually close as the excess pressure is relieved and seat itself, tightly closing off all by-pass water as soon as the normal pressure is reached. More damage can result to a power plant from the istallation of safety valves of excessive area and of wrong design than would occur if they were left off entirely. Too much stress cannot be placed upon the necessity of having the area of the relief valve discharge ports adjusted for the particular turbines and pipe line with which they are to be used. A separate pilot valve should be installed with the relief valve to secure heavy pressure seating, quick operation and free adjustment necessary to obtain the desired result.

Figure 4 illustrates such an apparatus as manufactured and installed by the Pelton Water Wheel Company. It will be noticed that the constant rotation of the pilot valve from the main wheel shaft enables it to float against the adjustables spring pressure, and that another decided feature of advantage is th t an extremely small quantity of water passes through it at each movement of the main valve; so that there is a minimum tendency for the piston valve to be cut by any floating material, and a minimum chance of its becoming clogged with leaves, sticks, etc.

It is of course better to keep the velocity of the water in the main pipe line as nearly constant as possible, but the economy of water, the available flow of most streams and the demands for power, make it necessary to retain in the reservoir A all the water which is not acturally used for developing power on the wheel shaft in the power house B; and a special form of by-pass nozzle is advised or a combination needle and deflecting nozzle. This is a device which is too well known to require any extended description; but, briefly, consists of a needle controlled by hand, by which the area of the stream discharging against the buckets on the wheel may be varied and the deflecting portion of the nozzle be controlled by governor, thus securing most accurate speed control, although changes in pipe velocity are made by hand at set intervals and so slowly as to prevent any dangerous water hammer occurring.

PERSONAL.

Professor C. L. Cory, Dean of the University of California, announces that after the completion of contracts already begun by Cory, Meredith & Allen, who will have their offices at the corner of California and Drumm streets, he will withdraw from this firm and open offices as Consulting Engineer in the Union Trust Building, San Francisco Professor Cory is one of the most eminent engineers on the Pacific Coast and his advice is sought by those interested in important engineering and development work.

Mr. Henry W. Goode the former director-general of the Lewis & Clark Exposition and president of the Portland General Electric Company, is one of the most popular as well as the most experienced electrical men in the northwest. He has now added responsibilities owing to the recent merger of the Portland Railway Company and the O. W. & Ry. Co. of which system he is the actual head, having been already elected president of the O W. & Ry. Co. besides retaining his present position with the Portland General Electric Company. Mr. Goode deserves and has the congratulations of his large army of friends in the electrical world.

Mr. E. C. Dewald, Pacific Coast manager of the Platt Iron Works, has started East on a visit to his home company at Dayton, Ohio. Mr. Dewald will arrange, while there, for the re-establishing of the Pacific Coast business on a permanent basis in San Francisco.

Mrs. R. E. Tutt, probably the only woman electrical engineer in the United States, recently visited the Pacific Coast while on her way to the Phillipine Islands. Mrs. Tutt has two big contracts now on hand and which are practically completed. One is a large power plant near Prescott, Arizona, 6000 horsepower, and the other a power plant at the same place for the Prescott Power Company of 10,000 horsepower. Mrs. Tutt is financially interested in both of these enterpises.

Mr. L. A. Osborne, third vice president of the Westinghouse Electric and Manufacturing Company, who has had general charge of the manufacturing, has been elected second vice president and will assume direction of the Engineering and Sales Departments. Mr. Osborne has been connected with the Westinghouse Company for fourteen years.

Mr. Theodore Starrett, president of the Thompson-Starrett Company of New York, one of the largest building construction companies in the world, is here, accompanied by Frank J. Kilpatrick, a New York builder and lumber man, already well known in San Francisco. Mr. Starrett visits San Francisco with a view to getting his construction company into this city for active participation in the work of rebuilding the business section He states that, under the Eastern system of construction, a ten story class A steel building may be erected in ten months from the day the work of demolishing the old structure is begun

Mr. E. K. Preston, formerly manager of the Los Angeles office of the Standard Underground Cable Company, has been advanced to the position of head salesman of the San Francisco office. Mr David Chalmers will take charge of the Los Angeles office. The Northwestern office has been removed from Spokane to the Pacific Block, Seattle.

Mr. P. J. Aaron, formerly allied with the Chicago office of the California Electrical works, leaves this week to open the company's new branch at Seattle. The California Electrical Works intends to carry a complete stock of supplies and power apparatus at Seattle in keeping with their Coast policy of making prompt deliveries from the principal Coast cities. Mr. Aaron's wide experience and pleasing personality should win for him a host of friends in his new territory.

Trade Catalogues.

Telephone World Review—The latest publication seeking the favor of the public is "The Telephone World," which is published in Lafayette, Ind., and has a guaranteed circulation of 20,000. The magazine is well printed and ably edited, and should find a large circle of readers in the ranks of those who take a scientific interest in the telephone.

Bulletin No. 2 has been issued by the Association of American Portland Cement Manufacturers under the title of "The Possibilities of Concrete Construction from the standpoint of Utility and Art." The text is the work of William L. Price, and the subject is handled with skill and thoroughness. It should interest builders and architects, who can readily obtain a copy of the bulletin by addressing Assitant Secretary C. Earle E. Battomly, 1232 Land Title Building, Philadelphia. Bulletin No. 3 will be entitled "Sand for Mortar and Concrete."

The Fourteenth Annual Report of the General Electric Co., contains statements of assets, liabilities, gains, losses, etc., together with comments by the president, vice-presidents and treasurer of the company.

"Sibley Journal of Engineering," Cornell University, Vol. XX, No. 7. Filled with exellent articles by G M. Walker, H. Diederichs, H. R. Halloran and S. R Schwartz.

"Loomotive Cranes, Buckets and Tubs.". The Wellman-Seaver-Morgan Company, of Cleveland, Ohio, have issued an attactive bulletin showing uses of locomotive cranes for a great variety of work, including manufacturing plants, iron and steel works, machine shops, railway shops and yards, docks, quarries and stoneyards, logging camps, plantations and for miscellaneous yard hoisting, hauling and transporting. This catalogue is profusely illustrated.

Clarkson Bulletin, Vol. 3, No. 2, April, 1906—The Thomas S. Clarkson School of Technology have issued a very interesting bulletin, which deals especially with the plans and purposes of the institution, giving a copy of their original charter, list of faculty, rules and regulations and requirements in various departments.

Electric Controller and Supply Company, Cleveland, Ohio—Bulletin No. 1, "Dinkey Ventilated Controllers." The bulletin is ilustrated with views of this controller, which was originally brought out by the Homestead Steel Works of the Carnegie Steel Company. Several tables of resistance fillings at various voltages are given.

Bulletin No. 2, "Type U. Controllers"—This bulletin is similar in plan to bulletin No. 101, but deals with the Standard Type U. controller, which are also manufactured by the Electric Controller and Supply Company.

University of Minnesota Bulletin, February 1st, 1906—Devoted entirely to the Department of Engineering and Mechanic Art, giving a very full summary of the course, equipment and requirements in this department of the University.

Southern Pacific Bulletin, "Lake Tahoe and the High Sierra," by A. J. Wells—Another of the artistic pamphlets dealing with localities along the Southern Pacific Railroad, written in an attractive style and gotten out with the same wealth of illustrations which has made these booklets famous among railroad literature.

Instruction Book No. 5006, Allis-Chalmers Co., Milwaukee, Wis.—Instructions for setting up and operating the Gates ball mill.

The Buckeye Electric Co., Cleveland, Ohio—"Side Lights on the Buckeye," giving in an attractive form a description of the merits of the Buckeye incandescent lamp, together with illustrations of installations at power stations, street railway cars, amusement parks, restaurants, factories, etc.

"Copper Gossip"—Weekly Bulletin giving quotations for copper in the regular markets of Europe and America. Issued by the National Conduit and Cable Co. 41 Park Row New York.

Portland General Electric Company's Bulletin for April, 1906, containing illustrations for business lighting, both interior and in lighting signs. This bulletin also contains descriptions of electrical conveniences for the home.

"Powerful Arguments," issued by the Curtis Advertising Company Detroit, Michigan, co-operating with the Co-operative Electrical Development Association Cleveland Ohio. This book is directed to central station managers and urges a campaign of mail advertising, telling about electric power with a view of educating the people to its larger use.

General Electric Company's Publications—

Flyer No. 2175, "Type S. C. Speed Controlling Rheostats."

Flyer 2178, "Key and Keyless Receptacles."

Flyer 2179, "All Porcelain Wireless Clusters."

Flyer 2181, "Receptacles for Outdoor Wiring."

Flyer 2182, "Type MA 13 A Copper Ribbon Fuse Box."

Flyer No. 2183, "Type MS 8 Hood Switch for Railway Service."

Flyer No. 2184, "Type T. Form D and Form D-2 Fuse Holders."

Supply Catalogue No. 7597 supercedes No. 7584, "Marine Supplies," which have for many years been the standard of the United States Government, fully illustrated with price list.

Supply Catalogue 7596, "Sprague General Electric Type M Control Apparatus."

"Lighting Arresters," Catalogue No. 1052 and suppement thereto giving dimensions, connections and instructions for installing.

The above catalogues may be had by addressing the General Electric Company, Schenectady, New York, or any of their branch offices.

Book Review.

"Notes on Electro-Chemistry," by F. G. Widemann, Ph. D. McGraw Publishing Company, New York; 143 pages. Price, $2.00 net.

A very valuable book. It offers a general survey of a subject of rapidly increasing importance, and serves as an introduction to its study. It has a very excellent chapter on electro-technology. Each chapter is preceded by a bibliography of important treatises bearing on the subject matter discussed. It deserves very careful reading.

LOW FREIGHT RATES FOR CEMENT.

The action of the Southern Pacific Company in reducing the freight rates on cement from all Missouri river points will have the effect of greatly facilitating the work of rebuilding San Francisco.

The announcement of a cut in the rate was made by District Freight Agent Thielen.

The reduction in the rate for carrying cement is from 75 cents per hundred weight to 35 cents from all Missouri river shipping points to the Pacific Coast. This will make a rate of 47½ cents from Chicago and Ohio cities.

The railroads' action will be of great benefit to those who contemplate the erection of buildings.

All shipments of material for the rebuilding of San Francisco, will be given preference over other freight, according to another order of the Southern Pacific Company.

Mr. A. M. Funke, formerly of the Standard Electrical Works, has accepted the position of city sales manager with the California Electrical Works.

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EDITORIAL

The Muck Rake in San Francisco.

President Roosevelt's forcible characterization of the "Yellow Critics" aptly applies to the journalistic comments of a part of the San Francisco press. The present time should be one for the exercise of charity. The severe strain under which San Franciscans have labored, and their naturally nervous condition at this time, makes it all the more reprehensible for the public press to awaken prejudices, excite distrust or inflame passions. Following the great calamity which recently overtook San Francisco, the entire country opened its heart and hand in a noble and most generous manner; the municipal authorities laid aside every partisan feeling and with great personal sacrifice did their full duty as citizens; the professional men, despite the great losses which they had experienced of libraries, papers, etc., stirred themselves to unusual exertions in formulating plans, making suggestions and lending practical help in the work of reconstructing the city; and the corporations whose interests lay in the city were most liberal in forcgoing personal gain and co-operating in every way with the authorities in restoring means of intercourse and water supply, lighting and transportation facilities. These prompt and public spirited efforts should find an echo in the heart of every resident of our city. Instead, however, of striking this responsive cord, the "Yellow" journalists have been especially virulent in their criticisms of those who have proven themselves to be San Francisco's best friends. We give herewith a few of the subjects of the "Yellow" criticisms, all of which have been displayed in scare head-lines and in heaviest face type.

"The Mayor Has Turned the City Over to the Railroad Looters."

"The Building Committee Has Reported a Cobweb Plan of Reconstruction That Is Impossible and Impracticable."

"The Insurance Adjusters Are Plotting How to Evade the Payment of Losses"

"The United States Government Has Squandered Its Relief Fund."

"Red Tape Rules the Board of Supervisors and No Work Is Accomplished"

"The Refusal to Allow Old Brick to be Used in Reconstruction Is Due to a Desire to Aid Eastern Brick Manufacturers."

"The City Is in the Power of the Title Guarantee Companies, Who Will Exact Fabulous Prices for Duplicate Records."

"The Authorities in Their Refusal to Allow Fires to be Built in Houses Are Indifferent to the Cries of Suffering and Defenseless Women."

"The Contractors Are Refusing Work to Californians and Giving Preference to Outside Laborers"

"Steel and Cement Manufacturers Are Jumping Up Prices and Delaying the Progress of Building."

"The Fire Limits Are to be Extended so as to Prevent Owners From Rebuilding and Enable Real Estate Men to Grasp Desirable Locations."

"The Mayor Has Placed On His Advisory Board Idealists and Not Practical Men."

If the world was as bad as it seems, or our city as black as it is painted, we would all feel discouraged and ashamed. However, the slight foundation of truth (if any) upon which the New Journalists base their sensational articles is so well known and understood that even the least intelligent of readers have come to discount these utterances.

Back Numbers of "The Journal."

If you have any and can spare same we would request that you forward them to our office, 606 Atlas Building, San Francisco. We have constant need of back issues of THE JOURNAL, and as our reserve copies (including our bound volumes) were entirely destroyed by the fire, we must depend upon the kindness of our friends in replacing same.

Notice to Subscribers.

We request each of our subscribers to send us his name and address and date of last payment, also copy of receipt therefor, in order that we may compare same with such of our records as were saved from the fire and avoid any possible errors or omissions. Also, all San Francisco subscribers should send us their new addresses in order to facilitate prompt delivery through the post-office.

Arc Lamp Post Competition.

Designs for practicable electric lamp posts for street and boulevard lighting were on exhibition recently at the Art Institute in Chicago. The Municipal Art League offered prizes of $100, $75 and $50 for the best three designs, and a large number of drawings in water colors were entered into the competition. In judging the various designs, cost and utitlity were considered as well as artistic merit. It was specified that only one light was to be used and that the total height to the center of the light was to be eighteen feet. The materials specified were bronze or fine cast-iron. Each design was signed in cipher, by which it could be identified by James W. Pattison, secretary of the Municipal Art League, after the jury had awarded the prizes.

Industrial.

THE ELECTRC PROPERTIES COMPANY

The Electric Properties Company, incorporated May 10th, under the laws of the State of New York with a capital of six million preferred and six million common stock, has been organized to acquire, finance and develop properties, either whole or in part, especially those in which electricity plays the principal part, such as power, electric traction and electric lighting enterprises, and to invest and deal in and to guarantee the securities of corporations operating such properties. It will also conduct through Westinghouse, Church, Kerr & Co. (all of whose capital stock is owned by the new company) a general engineering and construction business. It may also issue collateral trust bonds secured by the pledge of securities acquired in the course of business.

The properties of the company, as mentioned above, will be mainly financial. It is not intended to make any changes in the organization or personnel of Westinghouse, Church Kerr & Co., whose operations have been highly successful and they will continue to be conducted under the efficient administration of Walter C. Kerr, President.

While the Electric Properties Company will avail itself of the engineering and construction organization of Westinghouse, Church, Kerr & Co., it will also use other engineering organizations for independent consulting engineers as circumstances may require. One of the objects of the new company will be to co-operate with vested interests, such as railways and other public service companies, in the development of properties for their account, and either temporarily or permanently assist in financing such properties.

The great rapidity with which the uses of electricity are being extended, not only in the creation of new enterprises, but in changing the character of existing enterprises, will, it is believed, afford constantly increasing opportunities for the profitable investment of capital.

John F. Wallace has been selected as president of the new corporation, and two vice-presidents will be elected at the first meeting of the board of directors.

The following gentlemen constitute the directorate, all of whom will be actively interested in the conduct of the business of the Electric Properties Company: Charles H. Allen, vice-presiednt Morton Trust Company, New York; Paul D. Cravath, Cravath, Henderson & De Gersdorff, New York; H. D. Giddings, New York; N. W. Halsey, N. W. Halsey & Company, New York; George Smith, vice-president Security Investment Company, Pittsburg; John A. Spoor, president Union Stock Yard and Transit Company and president Chicago Junction Railway Co., Chicago; Moses Taylor, Kean, Van Cortlandt & Co,, New York; E. G. Tillotson, vice-president, Cleveland Trust Company, Cleveland; F. D. Underwood, president, Erie Railroad, New York; R B. Van Cortlandt, Kean, Van Cortlandt & Co., New York; John F. Wallace, president Electric Properties Co., New York; George Westinghouse, president Westinghouse Electric and Manufacturing Company, Pittsburg; The headquarters of the company will be at 111 Broadway, New York.

FEDERAL ELECTRIC SIGN COMPANY OF CALIFORNIA

The Federal Electric Sign Company of California has recently been incorporated with the following officers: H. M. Estes, president; Edward H. Neisz, vice-president and general manager.; W. D. Shawhan, secretary

This company will have its principal place of business located in San Francisco (definite location to be announced shortly) and will establish at once a branch at Los Angeles to take care of the demand for Federal Signs and Specialties in the Southern part of the State. The business and general policy of the company is under the direct management of Mr Edward H. Neisz, its vice president and general manager. Mr. Neisz for many years was with the Chicago Edison Company, one of the largest commercial lighting and power companies in the world. Something like two years ago he arrived from Chicago equipped with the agency for the State of California covering all the specialties manufactured by the Federal Electric Company, of Chicago. He has been most successful during his stay here in selling and distributing these signs and has concluded to organize the above named company for the purpose of extending the Federal interests in this section. The Federal Electric Sign Company of California will be thoroughly equipped in every department to handle all business of the great State of California to better advantage than has been possible heretofore.

HORIZONTAL ENGINE.

The award of a patent relating to the horizontal type of steam engine by the United States Patent Office, January 30, 1906, to Edwin Reynolds, dean of Corliss engine designers, and for many years identified with the Allis-Chalmers Company, together with the recent remarkable showing in the tests of combined vetriical and horizontal engines in the subway power house, New York City, suggest an incident characteristic to Mr. Reynolds related by those who were close to him at the time when this type of engines was first evolved, nearly seven years ago, when the application was filed for the patents only recently granted.

The incident referred to occurred at the time when the Allis-Chalmers Company was called upon for advice as to the type of engines to be used in the immense new power house then being planned by the Manhattan Railway Company, New York City. It was the intention of their engineers to install units of 5000-kilowatt capacity. The first type of engine considered was the cross compound, vertical machine, similar to those furnished for the Metropolitan Street Railway, and some correspondence passed between Mr. Reynolds and the engineers of the Manhattan Railway Company on the subject, so that finally Mr. Reynolds was invited to come to New York and discuss the matter in detail. Mr. Reynolds left Milwaukee with the type of engine still unsettled, but with the understanding that the straight, cross compound, vertical unit would be used if it were found practicable. On the train, en route to New York, however, Mr. Reynolds evolved in his mind the possibility of using a combined vertical and horizontal engine, allowing four cylinders to be connected to one shaft, and before reaching New York he was prepared to offer the engineers in charge a definite proposition covering a combined vertical and horizontal four cylinder engine, now generally known as the Manhattan type, and furthermore he submitted the size of cylinders which he would recommend the size of crank-pin and crosshead pin and the size of main journals, with rough sketches of the proposed unit as he had planned it in his mind's eye. As a result of that conversation, the Allis-Chalmers Company received orders for eight pairs of such machines.

On Mr. Reynold's return to Milwaukee, work was at once begun on the design of the new engines in accordance with the data used by him in his New York proposition. When the complete designs were ready, it was found by comparison that in the rough notes made by Mr. Reynolds while on his way East he had arrived at identically the same dimensions of various parts as those obtained from the carefully worked out designs.

It is said that this incident is only one of a great many which have occurred during Mr. Reynold's long service with the old E. P. Allis Company and later with the Allis-Chalmers Company which displays his wonderful engineering ability and his promptness in making decisions. The horizontal vertical type of engine was later adopted by the Rapid Transit Subway Construction Company, showing the confidence of its engineers in these units.

STORAGE BATTERIES.

A paper, recently presented by Dr. Rudolf Gahl before the Colorado Scientific Society, deals with the scientific principles of electric storage batteries and contains much that is interesting. Dr. Gahl gave a concise review of the present situation of the lead storage battery. He described the methods of Plante and of Brush Faure as follows:

"Positve Faure-Brush plates are not made by any prominent plant in this country, except in small sizes for automobile work; in fact, it is very difficult to make them, but it is possible, for some good plates of this type are manufactured abroad.

Negative Faure plates are made in this country by the Electric Storage Battery Company of Philadelphia, Pa., and by the National Battery Company, Buffalo, N. Y. The negative Brush plates formerly had the same disadvantage which the Plante plates still have, of losing their capacity after some time of service through shrinkage, but it has been found that by giving the paste used for manufacturing these plates a certain composition, that tendency for shrinkage can be overcome, and that it is even possible to manufacture plates which expand and become more and more porous after they have worked some time. The expansion, and accordingly the porousity of the plates, had to be kept down to prevent falling off of the active material.

"Recently another type has been brought on the market by the Tudor companies, in Europe and by the Electric Storage Battery Company in this country, which permits the use of material of high expanding power, the falling off of active mass being prevented by a kind of perforated lead wrapper, cast together with the grid. This plate is called box plate, and means a vast improvement over the negative plates made before, and it evidently seems to solve the problem of negative plates, for now the negative plates have longer life than the positive plates, whereas formerly the life of the battery was always limited by the negative plates."

A NEW CONDENSER

Messrs. W. H. Allen & Co. of Bedford, England, have brought out a new form of condensers for steam turbines. It is constructed in the form of a foundation for a turbine of the Curtis vertical type, the turbine being erected upon the open top of the condenser. It is designed so that the footstep of the turbine will be within the condenser itself so that there is no need for a stuffing-box for possible air leakage and exhaust pipes are eliminated entirely. Two types have been developed. One is a surface condenser with tubes divided and supported by dispersion or directing plates. In the other type the principle of jet condensing is adopted.

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Brief Interviews With Leading Manufacturers and Dealers on the Present Situation and Prospects.

General Electric Company—Dr. Addison says: "We have made only temporary arrangements for location in Oakland; even our warehouse at Emeryville is on a short lease, so that we shall be ready for an entire transfer back to good old San Francisco as soon as we can find suitable accommodations for our office force of eighty persons, and our new warehouse at Fifteenth and Kansas streets, San Francisco, the contract for which was signed in Schenectady, before the fire, is ready for occupancy. This warehouse covers 80,000 square feet of space, and is the most complete building of its character erected on the coast. As regards our stock, we are in a peculiarly fortunate position to supply orders. One-fourth of our old stock was in a warehouse not affected by the flames, and since the fire, in addition to large shipments from our Los Angeles and Portland office, we have received fifty carloads of goods, which enable us to fill all orders for motors, transformers, meters, arc lamps, incandescent lamps and wiring supplies."

Westinghouse Electric and Manufacturing Company—Mr. Briggs, who has just returned from the East, says: "I found the Eastern people anxious to co-operate in the fullest way to meet the conditions here and supply the unusual demand. I placed large orders for our full line of goods and arranged for next two years to carry three times our normal stock. We have moved to our new one story building at Second and Howard streets, San Francisco, where we shall remain for one year until we get into the new steel and reinforced concrete structure at Second and Natoma streets, in which we shall occupy the first three floors."

Pelton Water Wheel Company—"Many orders have been booked since the fire, and it is gratifying to note the sympathy and indulgence of our customers in these confusing times. Voluntary remittances, many of which were not yet due, have come from all sides, in several instances being made in currency in amounts up to several thousands of dollars, the idea being in the minds of our customers that banking facilities were not available. From all sides is expressed the conviction that San Francisco will retrieve herself completely in a few years, and that the financial situation will be made easy by outside capital, if necessary. This company has temporary offices at 1259 Alice Street, Oakland, but will be permanently located in the Monadnock Building, San Francisco, after June 15, 1906."

Drendell Switchboard Company—"We are pleased to announce that we have secured, temporarily, the mechanical department of the Wilmerding Industrial School, located at Seventeenth and Utah Streets, San Francisco, and are fully equipped to manufacture switch and panel boards of all kinds, starting devices, and electrical appliances of every description. Our repair department offers the best facilities in the city for reconstruction and rewinding of electrical machines damaged by the recent fire. Our Mr. Drendell is at present in the East giving his personal attention to the immediate shipment of a complete stock of switches, materials and machinery for the most up-to-date factory of its kind on the Pacific Coast, the location of which will be announced later. Our policy, as heretofore, will be strictly adhered to."

Standard Underground Cable Company—Mr. Saurman says: "Our business is large—indeed, its volume is phenomenal. We have all kinds of stock now on hand and can fill orders. We have just sold the United Railroads of San Francisco between 600,000 and 700,000 feet of bare and weatherproof wire. You may set us down as enthusiasts over the present outlook."

H. W. Johns-Manville Company—This concern has just removed to 180–182 Second St., S. F., where they have commodious offices and warehouse. They have been drawing on the stock of their Los Angeles and Seattle branches; but now have received one carload of "Noark" fuse material. Several other carloads are on their way of both "Noark" and overhead railway trolley material, so that they will be in shape to supply all orders.

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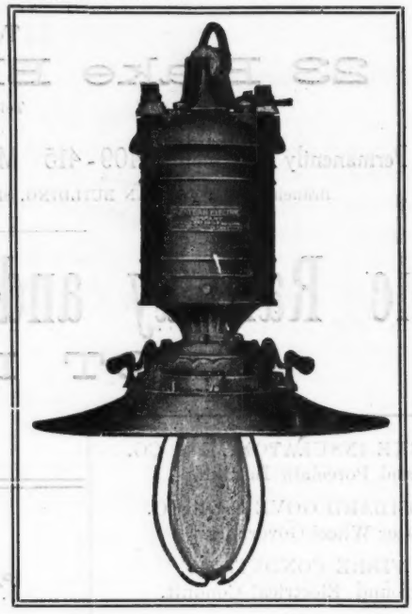

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Simplex Electric Heating Co., Boston, Mass. Electric Heating Apparatus.
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Mechanical Appliance Co., Milwaukee, Wis. D. C. Motors (small sizes).
Century Electric Co., St. Louis, Mo Single-phase A. C. Motors, A. C. Ceiling Fans.
American Vibrator Co., St Louis, Mo. Electric Vibrators.
Triumph Electric Co., Cincinnati, O. D. C. Generators and Motors.
Warren Electric Manufacturing Co., Sandusky, O. Steam Turbines and A. C. Generators.
Commercial Electric Co., Indianapolis, Ind. Two- and Three-phase Induction Motors.
Jandus Electric Co., Cleveland, O. Enclosed Arc Lamps and Fan Motors.
Lafayette Electric Manufacturing Co., Lafayette, Ind. Hornberger Transformers.
Duncan Electric Manufacturing Co., Lafayette, Ind. A. C. and D. C. Wattmeters.
Jewell Electric Instrument Co., Chicago. Portable and Switchboard Instruments.
De Veau Telephone Manufacturing Co., New York. Telephones.
California Incandescent Lamp Co., San Francisco. Incandescent Lamps.

LARGER THAN EVER

Cars en route and Large Stock on Hand

Holabird, Reynolds & Sayles Co.—"We have just closed a lease on the premises formerly occupied by the Brooks-Follis Electric Corporation, at 527 Mission Street, San Francisco, and in addition have leased the 50x80 lot immediately in the rear and fronting on Minna Street. The rear lot we shall use as a wareroom, and a building on same will be ready for occupancy within a few days; also we shall hurry the construction of a permanent one story building at 527 Mission Street, so that we may be said to be among the early occupants of permanent structures on this street." Mr. Holabird will reside permanently near San Francisco, having leased a home at Mill Valley, to which he will remove his family from Los Angeles next week.

Standard Electrical Works—"We have just received a shipment of commercial three-phase motors, Hornberger transformers, and general supplies, Our business is way ahead of all past records.

Woodin & Little—"We shall remove shortly to our new one story building on Mission Street, between First and Second, where we shall carry a complete line of pumps of all descriptions and for every conceivable use; also tanks, hose, windmills, gasoline engines, pipe fittings, lawn goods, etc." The removal of Woodin & Little from their former location on lower Market Street emphasizes the tendency of all machinery and electrical houses to concentrate in the Mission Street center.

A. S. Keeler & Co.—"We have recently received a large assortment of fuse-wire, bolts, nuts and dry batteries. We have also pleasure in announcing that our house has been accorded the Pacific Coast agency of the Union Porcelain Company, of Trenton, N. J., also of William J. Murdock Company, manufacturers of solid telephone receivers and moulded rubber push buttons. Our new warehouse on Folsom Street, between Fourth and Fifth, will be ready July 15th, and we believe that this will be the first permanent building in the burnt district constructed since the fire.'»

Tracy Engineering Company—"We have been awarded the contract for a compound condensing Nordberg Corliss engine for the Pacific Cereal Association's fine new mill, which will be the best of its kind on the Pacific Coast. The plant will be arranged so that the capacity can be increased 100 per cent. a little later on, and when completed will be one of the most economical power plants in the West.

CORNER STONE LAID FOR UNITED ENGINEERING BUILDING.

Last December Mrs. Andrew Carnegie laid the cornerstone of the new Engineers' Club on West Fortieth Street, New York City. On May 8 she performed the same ceremony for the new United Engineering Building on West Thirty-ninth Street. The two great structures stand back to back "four square," between Fifth and Sixth Avenues, and are already very far advanced toward completion. The exercises in both instanes were quite informal, as no extensive celebration will be attempted until both buildings are actually finished and available for occupancy.

A BUILDING ENTIRELY WITHOUT WOOD.

There is at present nearing completion in the city of Bridgeport, Conn., a building which is unique in the fact that it contains no wood whatever and which will be when finished as nearly fire-proof as it is possible to make it. It is constructed on the cantilever plan and is supported by foundations of great strength. The walls are of concrete, the floors are of compostion which is fire-proof, and the doors, window sills and frames are of metal. The staircases are of winding type and are made of concrete. The structure is attracting much attention on the part of engineers and insurance men by reason of the fact that the building will be absolutely devoid of wood and that every feature of construction has proved its value, there being no methods employed that are experimental.

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Home and Foreign News.

TELEPHONE STATISTICS

A special report on telephones and telegraph for 1902 has been issued by the census office. It shows that in 1902 the telephone systems of the country operated more than three-fourths of the wire mileage reported for both telephones and telegraph, giving employment to seven-tenths of the wage earners, paid more than two-thirds of the wages, received more than two-thirds of the total revenue and paid more than two-thirds of the total expenses.

For the commercial systems the mileage was 4,779,571 and the number of telephones 2,225,971; for the mutual systems the mileage was 790,105 and the number of telephones 89,316, and for the independent lines the mileage was 49,965 and the number of telephones 55,747.

The number of salaried employees engaged in the telephone service was 14,124, and the average number of wage earners 64,626. The amount paid in salaries was $9,885,86 and in wages $26,369,735. The number of messages or talks reported during the year was 5,070,554,553, of which all but 120,704,844 were local calls, the remaining being long distance or toll calls. Ohio led in the number of messages with 558,707,801, and Illinois was next with 541,160,932. In long distance and toll traffic Pennsylvania was first with 20,461,900 messages and New York was second with 20,367,024. On the average there was one telephone to every thirty-four persons and each person talked sixty-five times a year. San Francisco, with one telephone to ninety-six persons, was the best telephone city in the United States in 1905.

The average revenue per telephone amounted to $37.50, and the average per message to 1.7 cents; while the average operating expense was 24.50 per telephone and 1.1 cents per message. Incidentally the report shows that on January 1, 1901, the number of telephones for the United States was 3,300,000 and the number for European 485,784.

The commercial telegraph systems of the country owned and operated 1,138,350 miles of wire in 1902. In addition there were 16,677 nautical miles of submarine cable. The telegraph systems had a capitalization of stocks and bonds of $162,946,525, and total assets of $195,503,475 A sum amounting to $15,003,003 was paid in salaries and wages to 829 salaried employes and 26,798 wage earners.

AN ELECTRICALLY EQUIPPED HOTEL.

The new Hotel Belmont, at Forty-second street and Park avenue, New York city, was opened for the inspection of 6,000 or more invited guests May 7. The hotel consists of twenty-eight stories, and is 368 feet in height. Five stories are below the street level. Four years have been consumed in erecting the building, which with its equipment, cost about $7,000,000. Seven thousand tons of steel have been used in the construction. Beginning at the foundation, sixty-eight feet below the surface, the two lower basement floors are given up to the mechanical equipment. This includes a boiler plant of 1,700-horsepower capacity, an electrical generating apparatus of 1,200-horsepower capacity, and exhaust steam-heating system, ventilating system, a seventy-five-ton ice plant, filtering apparatus for water and air, fire service pumps, garbage incinerator, vacuum cleaning system, cold storage for 800 tons, and elevator machines.

There are sixteen electric elevators and ten electric dumb waiters, and pneumatic tubes running from the lowest basement floor to the roof. The pneumatic tubes have discharge pockets on each floor for the despatch of messages, cards and mail. The guests rooms are equipped with outside windows, artificial ventilation, telephones, electric clocks and electric hair curlers. The temperature is regulated throughout the entire building. The lighting arrangements are on a most elaborate scale, the use of crystal in the electroliers making the effect one of remarkable beauty.

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Offer Quick Delivery of

STEEL CASTINGS

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Boring, Key-Setting, Turning, Planing, Drilling, Milling or Fitting Work Done Promptly and Well.

ANNUAL REPORT OF THE GENERAL ELECTRIC COMPANY.

The fourteenth annual report of the General Electric Company to the stockholders has just been issued. The Company received orders for apparatus worth $50,044,272; billed out, $43,146,902, and collected. $44,419,613, an average rate of increase of 13 per cent. being shown for the last ten years. President C. A. Coffin in his report said: "The profits of our company for the past year (including $173,389.52 from securities sold, and $798,539.27 from royalties, dividends, sundry profits, etc.) after deducting all patent, general and miscellaneous expenses, and allowances for depreciation and losses, and $1,838,362,.46 from factory plants and machinery, were $7,319,160.61.

Vice-President Eugene Griffin in his report states that during the year the company had received orders for 300,000 hp of heavy traction motors and 750,000 hp of all classes of railway motors. In the Curtis steam turbine department, up to February 1, 1906, orders had been received for 535 turbines and 346 had been shipped. From 11 foreign countries orders had come for 44 turbines.

General Griffin reported that 208,229 separate supply orders, not including contracts, has been received, an average of 694 per working day, or 124 more per day than in the previous year.

Third Vice-President E. W. Rice, Jr., makes a full report on the operations of the company from the factory and technical end, and gives numerous details as to extensions to the different works. "Expenditures aggregating $2,338,362 have been made during the year for real estate, erection of new factories, extensions to existing buildings, additional machinery, patterns, special tools, furniture, etc. The following table shows approximately the floor space and the number of employees during the last five years:

	Floor Space	Employees
1902	2,500,000	15,000
1903	3,000,000	18,000
1904	3.700,000	17,000
1905	4,100,000	18,000
1906	4,350,000	22.500

"The land area of all three plants is now about 439 acres. The total book sale of the Schenectady, Lynn and Harrison factory plants, including both land and buildings, is $4,843,812.88 or about $1.10 per square foot of manufacturing floor space."

STEEL RAILROAD TIES.

To substitute wooden railroad ties with steel is the aim of Wiilliam E. Corey, president of the United States Steel Corporation, who has addressed a circular to various railroad presidents and others interested in different lines asking for co-operation. In his letter Mr. Corey says:

"In the discovery and fostering of new uses for steel, I think you will agree with me that the interests of the railroads and the steel manufacturers are identical. The manufacture of steel in this country, as you know, received its first great impetus thro gh the use of steel for rails. Further growth resulted from the use of steel in shipbuilding, pipe lines, tanks, buildings, and last, a great expansion from the introduction of steel cars.

"We confidently predict that the next great step will be the general introduction of steel shapes to replace wooden ties By the end of this year the Bessemer & Lake Erie Railroad Company expect to have in their tracks 105,000 of these ties which will cover forty-two miles of track and weigh 9950 tons. This expenditure is based on experimental track laid by them in the fall of 1904 which has shown satisfactory results under the exceptionally heavy traffic of last year. In addition experimental lots have been laid out by about ten other companies."

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WORK FOR A THOUSAND ENGINEERS

Actual work on the new $161,000,000 system for increasing the water supply of New York City, drawing from Catskill streams, will begin almost immediately. Fifteen thousand men will be at work before the end of the year By this time next year probably twice as many men will be employed along the ninety-six miles of the proposed aqueduct. To impound the water in the Catskill mountains eight great reservoirs will be required. These will cover an area of more than 16,000 acres, the land now occupied by thousands of persons, much of it devoted to agriculture. The largest of these, the Ashokan reservoir, alone will cover an area of 10,120 acres and when full will hold 170,000,000,000 gallons of water. Nine villages must be wiped out for the Ashokan reservoir, and numerous other villages will disappear from the sites of seven other reservoirs. Nineteen miles of the track of the Delaware and Ulster railroad will have to be removed and a new road built several miles to the south of the present line. The total capacity of the eight reservoirs will afford a daily supply of 258,0000,00 gallons. A thousand engineers will be employed on the work.

In all 18,000 acres of land will have to be bought by the city for reservoirs and mains.

AMERICAN INSTITUTE OF ELECTRICAL ENGINERS ELECT OFFICERS

A contest for the election of a president of the American Institute of Electrical Engineers has closed, with the choice of Professor Samuel Sheldon, of the Brooklyn Polytechnic Institute. Other officers elected were: Vice Presidents, A. A. Armstrong, Schenectady; H. H. Humphrey, St. Louis; F .G. Baum, San Francisco; Treasurer, George A. Hamilton, New York; Secretary, Ralph W. Pope, New York.

GOVERNMENT FUEL INVESTIGATION.

The final report covering the investigations during 1904 at the fuel testing plant at St. Louis, Mo., under the United States Geological Survey, is being published by the Government and will soon be ready for distribution. Many of the results of this investigation were published in "The Journal" for March 1905. The report will appear in three volumes as Professional Paper No. 48, and will be distributed free of charge. Persons desiring copies of this report should apply for the same to a member of Congress from their district, or to a senator from their state.

The work done by the investigation covers more than 1,600 chemical analyses of coal. On the gas producer and gas engine field there were eighty-five tests made, extending over two or three days and applying to coals, lignites and peats from eighteen states. These tests show the suitability of the different American bituminous coals, lignites and peats for power production in gas producers and gas engines. As a result, it is said that fourteen different concerns are now making producers for power purposes or perfecting designs.

In a letter from the director of the Geological Survey, embodying the results obtained, it is said that "the advance made in simplying and handling the gas producer equipment at the St. Louis plant have so increased its efficiency that the average bituminous coals recently tested have yielded in at 2.6 times the amount of power they have given under steam boilers of similar capacity (250 horsepower,) and in several cases this difference in favor of the gas power has been considerable greater."

Tacoma, Wash.—The Home Telephone Company will soon begin extensive operations in the city. Plans for the new telephone building are being drawn by Architects Russell and Babcock.

The PARKER
Water Tube Boiler

Secures Greater Absorption of Heat and Consequent Economy

NO *WET STEAM*
BURNT TUBES
LEAKING

A NEW SYSTEM OF STEAM MAKING. Practically a Non-scaling Boiler.— While the scale forms it cracks off and is found in the scale pocket at the front ends of the drums, whence it is easily removed through the manhole when the boiler is down for inspection.

The Philadelphia Rapid Transit Company are building one of the largest and best equipped power stations in the world. It is to contain sixty-four Parker Double Ended Superheater Boilers over automatic stokers. Each boiler will develop 1000 boiler horsepower without being forced, making over 100,000 engine horsepower for the station. This is the fifth order from this company, which already had over 10,000 horsepower of these boilers in use.

PACIFIC COAST AGENTS:

Keystone Boiler Works

SAN FRANCISCO - - CALIFORNIA

STILL BUILDING CALIFORNIA-MADE ELEVATORS

In Spite of the Fire and the "Elevator" Trust

STYLES	NOW RUNNING
FULL AUTOMATIC	Atlas Building (10 stories) Mission St., nr. Second
ELECTRIC	Western Addition, Masonic Hall, Fillmore St.
HYDRAULIC	Regillus Apartments, Pacific Avenue, nr. Van Ness
BELT	Merchants' Ice and C. S. Co., Sansome, nr. Lombard
AUTOMOBILE	Volkman Building, Jackson St., near Sansome
BUILDERS' HOISTS	(One Hundred of our Elevators Burned)

The ***Van Emon Elevator*** in the ***Atlas Bldg.*** (10 stories), Mission St., near Second, was the first electric elevator to run since the fire.

Van Emon Elevator Co.

46-54 Natoma St. San Francisco

Our eight elevators in Mr. H. E. Huntington's "Pacific Electric (Railway) Bldg." Los Angeles, Cal., we refer to as a Model Elevator Installation.

CONCRETE FREIGHT DEPOT FOR SANTA FE.

Carl Leonart has been awarded a contract for the construction of a concrete freight depot for the Santa Fe Railroad Company, to be located on Santa Fe Avenue extending from Third Street to Fourth. The building will be equipped with freight elevation automatic gates, rolling steel doors, intercommunicating telephones, pneumatic tube service, automatic sprinkler system and a vacuum air suction cleaning system. It will be heated by steam and lighted by electricity. The architect is Harrison Allbright.

EXTENSION OF COLUMBIA RIVER BREAKWATER.

Contracts to supply 210,000 tons of rock for the extension of the Government jetty at the mouth of the Columbia River were awarded to the Columbia Contract Company and the Cascades Construction Company. The former concern will furnish 160,000 tons and the latter 50,000. The 210,000 tons of rock will cost the Government $238,500, which will come out of the appropriation of $400,000 recently granted by Congress to be used in extension for the jetty. The Columbia Contract Company supplies the rock at $1.15 a ton. The Cascades Construction Company charge $1.09 a ton.

SPOKANE ENTERPRISE.

Jay P. Graves, president of the Inland Empire Railway company, states that his company will spend $700,000 in the development of a power site 12 miles northwest of Spokane on the Spokane river, supplying power to the company's electric systems and invading the electric field in this city. The company claims water rights for six miles along the river and will erect a dam 60 feet high where Deep creek enters the Spokane river. The company claims water to the extent of 3,000 cubic feet a second and also the use of the river bed, banks and lands adjacent to the storage reservoir. The work starts immediately. It is planned to develop 9,000-horsepower at a cost not exceeding $80 per horsepower.

LOS ANGELES WATER SUPPLY.

Work has been nearly completed by the Los Angeles water department on the Ivanhoe high gravity reservoir, located about a half mile west of Edendale, just north of the city limits, and water will be turned into it in a few days. This reservoir will have a capacity of 50,000,000 gallons and will cost $28,500. The pipe system with which it is to be connected requires an expenditure of $150,000.

A PROPOSED EXTENSION.

The Home Telephone Company propose to extend their line from Julian and Cuyamaca across the desert to Imperial. Connection would be made with the town of Imperial, Brawey, Calexico, Holtville, El Centro, Heber and other places, thus affording direct telephone connections between San Diego and Los Angeles.

MACHINERY ORDER PLAOED.

The Dominion Copper Company have just placed orders for a tandem compound electric air compressor having a capacity of 2300 cubic feet of free air a minute, also to include an electric motor of 400 horsepower; also a 150 horsepower motor, electric hoist, transformers, etc.

The John M. Klein Electrical Company

Have Located Temporarily at

1268 Clay St. OAKLAND

Will remove shortly to San Francisco

The Schaw-Batcher Co. Pipe Works

Incorporated

Manufacturers of

RIVETED IRON AND STEEL PIPE

Tanks of all descriptions for Water, Oil and Gas.
Single and Double Well Casing.
Our Specialty: Riveted Pipe for High Pressure.

Engineers and Contractors for the complete installation of Pipe Lines used in the operation of Hydraulic Mines, Power Plants, Water Works, Irrigation, Reclamation, Etc. We have special facilities for supplying general supplies for Mills, Mines, Etc.

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SPOKANE, WASH. PORTLAND, OR.
427 PEYTON BUILDING 336 SHERLOCK BUILDING
Telephone Main 603 Telephone Main 559

A NEW A. C. GENERATOR

A new alternating current generator which makes use of a commutator, or, rather, which is really little more than a pair of commutators. And, more than this, the machine is built on the homopolar principle. A homopolar generator with two commutators and delivering alternating currents is truly a strange combination. Nevertheless, such a machine has recently been patented in England by the British Thomson-Houston Company.

This alternator in principle is simple. The inductors or conducting bodies in which the electromotive forces are induced are segemental in shape and mounted radially so as to form two drums. These drums are attached to a common shaft, and suitable conducting wires connect the lower extremities of the inductors in pairs. The inductors themselves are of magnetic material and carefully insulated from one another and from the shaft upon which they are mounted. These parts of the machine resemble closely the ordinary commutator of a direct current dynamo forming, in fact, two commutators on one shaft. The magnetic field is set up axially by two coils, one at each end of the shaft, the complete magnetic circuit being made by means of a cylindrical consequent pole surrounding the shaft and projecting between the two commutators. There are thus two complete magnetic circuits, the lines of force passing through the inductors axially and in opposite directions. When the commutators are revolved, electromotive forces are set up radially in the inductor bars, in one set acting inwardly and in the other outwardly. By means of brushes pressing upon the outer surfaces of these bars currents may be drawn off. Thus far the machine is analogous to the recent direct current homopolar machine referred to above, except that it does not make use of collector rings. By connecting the different pairs of brushes in series the electromotive forces may be added together, and any value desired, within limits, be obtained.

NEW FIRE PROOF MATERIAL.

An officer of the Russian army has invented a new fireproof material called uralite. This name is given it in honor of the Ural Mountains where large quantities of asbestos which goes to make up a large part of Uralite is found.

It has proven a highly efficacious fire-resisting material, capable of standing a much greater degree of heat without exhibiting any apparent effect, than any fireproof material now on the market. Coupled with this fact it is extremely light, it is of great strength, is durable and is manufactured in sheets of varying size and thickness, thus rendering it a first class material for building purposes.

Uralite is composed largely of asbestos, but this is by no means the only substance used in its manufacture. Asbestos in its pure form, although it will resist high degrees of heat, is liable to disintegrate under the influence of excessive temperature. For this reason its utility is limited. The most noticeable feature of uralite is the facility with which it may be handled and adapted to other materials as a protection against fire.

It can be glued and nailed without any fear of its splitting during the latter process. It is especially available for panelling or other similar purposes, and can be grained or otherwise treated precisely as if it were wood. It does not swell or shrink under fluctuating climatic conditions, is waterproof and is a complete electric inqulator.

The remarkable immunity of the material from climatic changes may be gathered from the fact that a piece of the substance may be plunged into hot water and then immediately steeped in frozen mercury without showing any shrinking disintegration or other changes, physical or chemical.

It is capable of withstanding a great strain —eighteen tons per square in comparison with Portland cement which is only capable of supporting nine tons—so that it is an ideal material for flooring and ceilings.

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OAKLAND

Stock of Branch Store complete and offers exceptional opportunity for supplying San Francisco market.

News Notes.

Spokane, Wash.—It has been announced by an officer of the new Inland Empire Railway Company that the corporation will issue $10,000,000 in bonds in addition to its issue of $10,000,000 in preferred certificates and $10,000,000 in capital stock. That will make a total liability of $30,000,000 incurred by the immense new corporation organized to take over the "Graves group" of electric lines. The authorized securities of the subordinate companies are: Stock, Spokane Traction, $1,000,000; Spokane Terminal, $300,000; Coeur d'Alene and Spokane, $500,000; Spokane and Inland, $3,500,000; total stock, $5,300,000. Bonds, Spokane Traction, $1,000,000; Terminal, $350,000; Coeur d'Alene and Spokane, $500,000; total $1,850,000.

San Francisco, Cal.—The iron manufacturers and machinery dealers of San Francisco have effected a preliminary organization with the idea of having the manufacturers select some permanent site in San Francisco for the purpose of concentrating the principal iron industries at that place. The electrrical and machinery dealers have thought it advisable to locate within a radius of three blocks from Howard and Second streets.

Washington, D. C.—Secretary Taft urged before the House Committee on Interstate and Foreign Commerce the military necessity of a government cable to Guatanamo, Cuba, Porto Rico and the Isthmus of Panama. The total cost of a cable to touch at Cuba, Porto Rico and Panama, he said was estimated at $1,300,000. It could be laid by converting the army transport Sumner into a cable ship at nominal cost.

Oakland, Cal.—Patrons of the San Francisco Gas and Coke Company who have lost their meters in the fire are to be supplied free of charge by this company with gas until new meters can be supplied.

Washington, D. C.—The Bureau of Steam Engineering has obtained its extra fund for work at Mare Island Navy Yard, and arrangements have been made to proceed with work on the Solace and Bennington in addition to other ships, which have been laid up at that establishment. This will be of substantial benefit at Vallejo, where work has been praictically at standstill for some time through lack of funds.

Los Angeles, Cal.—Capitalists from North and East are preparing to incorporate a company to manufacture cement at Colton, San Bernardino county. The persons interested in the project include, Charles E. Ladd of Portland, Oregon; J. S McMillan, Railway Commissioner of the State of Washington; W. H. Dennis and H. C. Stratton of Portland, A. W. Patterson and Frank L Brown of New York, W. R. Newberry of Cleveland, A. L. Emery of San Francisco, Ira Judson Coe of the Lehigh Valley Railway and J. C. Kemp. The plans of the new company are said to include the erection of one of the largest plants in the world.

Astoria—This city is in the throes of a telephone war, and there is every indication that rates will be vigorously slashed and other changes brought about for the good of the general public before the strife is ended. The contestants are the Pacific States Telephone Company, which has maintained a system here for a number of years, and the Home Telehone Company, of Portland, which desires to share the field with its older rival with an automatic system.

Portland, Ore.—At the meeting of the Council recently the Portland General Electric Company applied for a franchise to instal and operate a steam-heating plant for twenty-five years. It is proposed by the corporation to build an immense plant for generating steam, and lay mains in all the principal business streets to distribute steam for heating buildings. The plant would cost over $200,000.

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Water Tube Boilers
An Ideal for
OFFICE BUILDINGS

Perfect Construction.
Dry Steam.
No Trouble with Tubes.
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Long Life — Cheapest Last Cost.

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C. H. Wheeler Mfg. Co. Condensers

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RAIL BONDS
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To Buyers on the Pacific Coast
We have recently issued a catalogue of electrical supplies. It contains 800 pages and is the most complete we have ever issued. It contains prices, standard package quantities, descriptions and illustrations. Every article has a telegraph co e word and number
Approximate weights are given for all articles.
If you have not received a copy write us. The number of the catalogue is 24.
Central Electric Co.
ELECTRICAL SUPPLIES
264, 266, 268, 270 FIFTH AVENUE CHICAGO

Lewistown, Idaho—G. W. Thompson, president of the Lewistown and Southeastern Railway Company, announced at Lewistown recenty that the electric line in that city will be in operation in six months. If the power plant is not in readiness by that time it is likely gasoline motors will be used temporarily to furnish power.

Milwaukee, Wis.—The plant and other assets of the National Electric Company, Milwaukee, Wis., were formerly transferred on May 1st to the National Brake and Electric Company, a corporation of Wisconsin, with a paid-up capital of $1,000,000. This company, as successor to the Christensen Engineering Company, and the National Electric Company, will continue the manufacture of air-brakes and electrical machinery. To facilitate prompt attention to all enquiries, the general sales office of the National Brake and Electric Company has been located at 519 First National Bank Building, Chicago, Ill. The Pacific Coast office is located at 708 San Pablo Avenue, Oakland.

Seattle, Wash.—Sealed bids will be received at Fort Wright until June 15th or furnishing and installing fixtures and installing watt-meters; installing transformers and making service connections, and furnishing watt-meters and transformers for the electric lighting of two double barrack buildings, one field officers' quarters, one double captains' quarter and one eight-set bachelor officers' quarters.

Seattle, Wash.—The capacity of the Alaska cable is to be increased about 75 per cent. by the use of a duplex system which is soon to be installed. Gen. Allen, chief signal officer of the army, has issued orders for the installing of the system on the northern lines.

Lewiston, Idaho—The Idaho Gas Company filed articles of incorporation; capital, $200,000; Isaac W. Anderson, Robert E. Allen, E. H. Gimper, C. H. Berryman and W. J. Thayer, incorporators.

Seattle, Wash.—The franchise for the proposed tunnel under the city to be excavated by the Union Pacific railroad was introduced in the council by Councilman Gill. The tunnel will enter the hill at Washington street between Fourth and Fifth avenues and emerge in block 34, A. A. Denny's Sixth addition.

Portland, Ore.—Articles of incorporation were filed in Multnomah county by the Oregon and Washington Railway Company; capital stock, $1,000,000; incorporators, W. W. Cotton, William Crooks and W. A. Robbins.

San Francisco, Cal.—The Bay Counties Railway Company has filed notice of the fact it would change its principal place of business from Napa to San Francisco. The Company was recently incorporated with $1,000,000 capital stock to build a railroad forty-five miles in length through Marin, Sonoma and Napa counties.

San Francisco, Cal.—The San Francisco Gas and Electric Company has decided to spend something like $2,600,000 in rebuilding the latter's office structure on Post street, between Powell and Mason, and its four electric power and light stations in various parts of the city that were wiped out by the fire. Willis Polk is the architect selected to draw the plans. The power and light stations are to be rebuilt on the sites of the old ones, as follows: Jessie street, between Third and Fourth; Fern avenue, between Polk and Larkin; Sutter street, between Powell and Stockton; Eighth street, between Market and Mission. All of these stations, like the new office building of the company on Post street, will be fire proof.

Pittsburg—The National Tube Company at McKeesport has received an order for about 1000 miles of pipe for use in SanFrancisco. In a few days the first string of cars containing a portion of the order will leave McKeesport.

Luitweiler Pumping Engine

The only Pumping Engine delivering constant stream of water without pulsation. Can be run by gasoline, steam or electric power on same base without belts.

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PUMPS for Electric Motors, Steam, Belt Power, and all kinks of uses. Pipe, Fittings, Brass Goods, Wind Mills, Gasoline Engines, Tanks, Garden Tools.

Salt Lake City, Utah—Work is under way on the construction of the new plant at Salt Lake City, Utah, which is being erected by the proprietors of the Utah Gas and Coke Company. W. E Mockett is to superintend the construction, with R. B. Brown as chief engineer. The superintendent of distribution is to be L. L. Cadwallader, and it is understood that W. J. McCorkindale will be the permanent superintendent.

Wenatchee, Wash.—The irrigation of the flat at Chelan Falls and the development of the abundant water power in the Chelan river for pumping plants along the Columbia river is a project now under way. Morris Thompson is president of the Centennial Mill Company. The company owns a plant at the falls and will use electric power in the mill there. The Chelan river with its 400 feet fall in five miles, has an energy of 100.000 horsepower, which as yet has been but little developed.

San Francisco, Cal.—As evidence that it expects an appreciable increase in the volume of traffic moving into and out of California in the immediate future, the Southern Pacific Company has placed a big order for new equipment with different car and locomotive works in the East. The new equipment is intended entirely for use in California. The order includes sixty chair cars, ten baggage cars, six diners, 1250 box cars, 100 flat cars, 300 refrigerator cars, 300 stock cars, eleven Atlantic-type locomotives, six Pacific-type locomotives, thirty-two consolidated locomotives and twenty-three switch engines.

Portland, Ore.—M. F. Donahue, acting for Eastern capital, has secured a franchise from the city of Gresham for lighting that city for twenty-five years. Power will be developed from Badger Creek.

Odessa, Wash.—An electric light franchise has been granted to William H. Zintner and H. R. Zintner of Spokane by the City Council. The Zintners were given a twenty-five year franchise, the town, however, reserving the privilege of buying the plant after the first ten years. Messrs. Zintner, who already have in their possession an electric light outfit, will install the plant at once, to be operated by steam.

San Francisco, Cal.—The Union-street cable road, from Oak street to the Presidio, will probably be converted into an electric line.

Palo Alto Cal.—The electric road into Palo Alto, already partly constructed by the Interurban Transit Company, will be completed by the middle of next November.

Portland, Ore.—The Council passed the franchises of the Cascade Power Company and Mt. Hood Electric Company, both of which propose to furnish light and power to the people of Portland, their sources of supply being streams in the vicinity of Mt. Hood and the Big Sandy River.

Pasco, Wash.—The City Council has granted to F. E. Elmendorf, of Spokane, the privilege of putting in a system of water works and electric light plant.

Spokane, Wash.—Spokane men are planning to build an electric railway in the vicinity of Big Falls, Wash., on the Pend d'Oreille river north of Newport, Wash. where the Pend d'Oreille Development Company recently incorporated in this county by Edgar A. Torrence, David T. Ham and Wilbur S. Yearsley, with a capital of $100,000, is arranging to utilize the water power of the river near Box Canyon.

Portland, Ore.—E. J. Frost, traffic manager of the Western Electric Company of New York and Chicago was in Portland recently for the purpose of selecting a warehouse site. His company desires a location on or near the right of way of either the Northern Pacific or Southern Pacific. The company is seeking a piece of property so a building can be erected having 10,000 to 20,000 feet floor space. Mr. Frost has been figuring with traffic officials and looked over sites offered.

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180-182 Second Street *SAN FRANCISCO*

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Overhead Railway Material

NOTE—"Noark" Fuse Material in Stock ready for Immediate Delivery. Railway Trolley Material in transit.

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FOURTH AND BERRY STS. SAN FRANCISCO

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